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# Oracle Database 11g – Unconventional Innovation

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# Oracle Database Innovation

30 years of  
sustained  
innovation ...



1977

2007

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# ORACLE 11g

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## DATABASE



# #1 Encrypted Tablespaces

# Encrypted Tablespaces

- Oracle Database 10g Release 2 introduced column encryption
  - Could not range scan
  - Primary/foreign key issues
- Tablespace encryption Removes those limitations
- Many encryption algorithms
  - 3DES168
  - AES128
  - AES192
  - AES256

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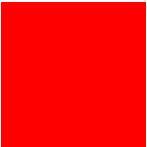
# #2 Cache More Stuff

## Cache More

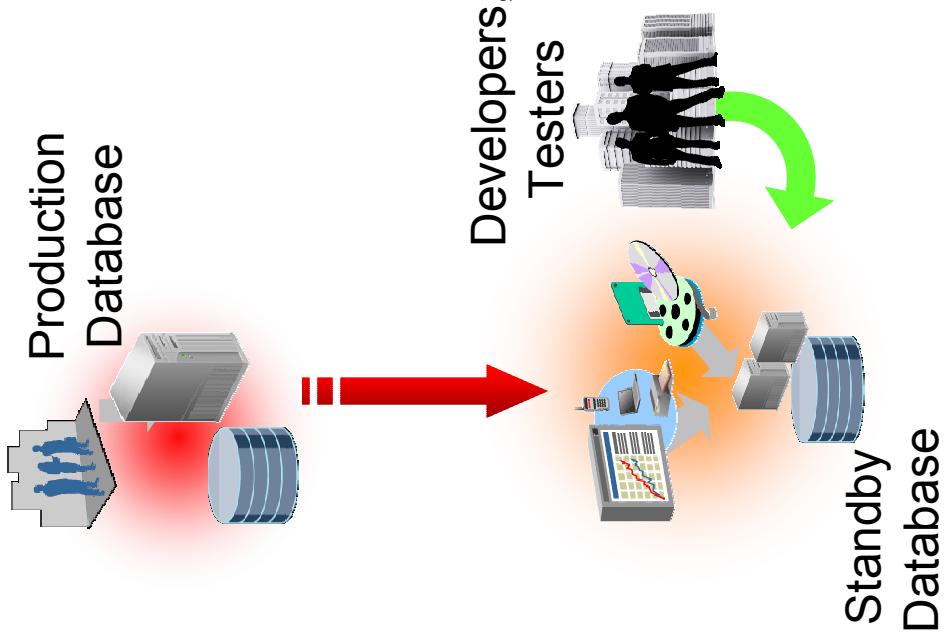
- Everyone knows the fastest way to do something is – ***to not do it***
  - Client Side Cache
  - Server Results Cache (JIT-MV)
  - PL/SQL Function results cache

# Guard

# #3 Active Data



# Active Data Guard: Develop & Test on Standby DB



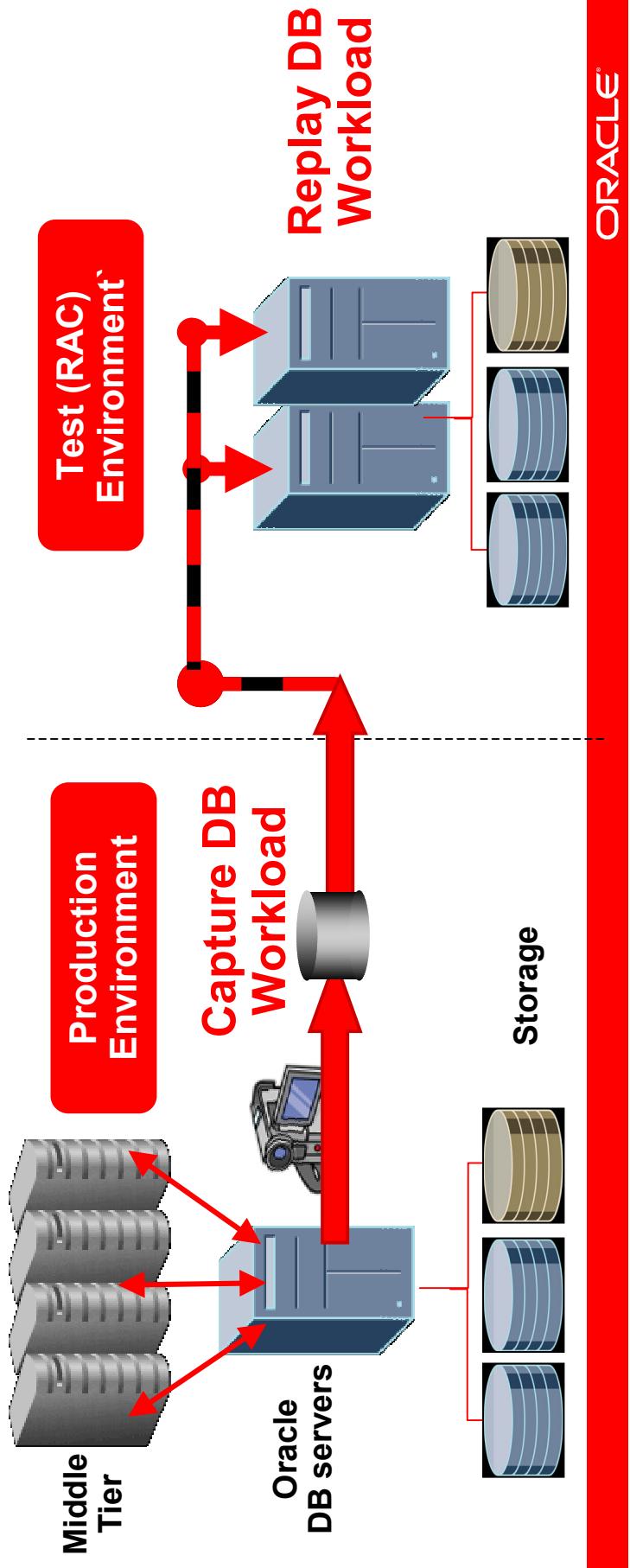
**Eliminates cost of  
idle DR system**

# #4 Real Application Testing



# Real Application Testing – Database Replay

- Recreate actual production database workload
- Capture production workload incl. concurrency
- Replay workload in test with production timing
- Analyze & fix issues before production



**#5 Smaller**

**more secure**

**DMP files**

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# Datapump

- COMPRESSION
  - ALL, DATA\_ONLY, METADATA\_ONLY, NONE
- ENCRYPTION
  - All, Data\_only, Metadata\_only, None, Encrypted\_columns\_only
- PARTITION\_OPTIONS
  - None, Departition, Merge

# Columns

## #6 Virtual



# Virtual Columns

- Create Table
- Alter Table Add Column
- Are ‘column expressions’
  - Expressions involving other columns in table
    - Constants
    - Deterministic functions
- Ease of use and Optimizer enhancement

# Virtual Columns

```
ops$tkyte%ORA11GR1> ALTER TABLE emp ADD (comp  
AS (sal+comm)) ;
```

Table altered.

```
ops$tkyte%ORA11GR1> exec  
dbms_stats.gather_table_stats( user, 'EMP' ,  
method_opt=> 'for_columns comp' ) ;  
  
PL/SQL procedure successfully completed.
```

# #7 Partitioning

just got better

# Partitioning

- Composite Completely
- Virtual Column Partitioning
- Partition by Reference
- Interval Partitioning

# #8 The long awaited pivot

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# Pivot

```
ops$tkyte%ORACLE11GR1> select deptno,
2      sum( decode( job, 'CLERK' , sal ) ) clerk,
3      sum( decode( job, 'SALESMAN' , sal ) ) salesman,
4      sum( decode( job, 'MANAGER' , sal ) ) manager,
5      sum( decode( job, 'ANALYST' , sal ) ) analyst,
6      sum( decode( job, 'PRESIDENT' , sal ) ) president
7  from emp
8  group by deptno
9  order by deptno
10 /
```

DEPTNO	CLERK	SALESMAN	MANAGER	ANALYST	PRESIDENT
10	1300		2450		5000
20	1900		2975		6000
30	950	5600	2850		

# Pivot

```
ops$tkyte%ORACLE11GR1> select *
  2  from (select deptno, job, sal
  3        from emp ) e
  4  pivot( sum(sal) for job in
  5    ( 'CLERK' , 'SALESMAN' , 'MANAGER' ,
  6    'ANALYST' , 'PRESIDENT' ) )
  7  order by deptno
  8 /
```

DEPTNO	'CLERK'	'SALESMAN'	'MANAGER'	'ANALYST'	'PRESIDENT'
10	1300	2450	5000		
20	1900	2975	6000		
30	950	5600	2850		

# Data Archive

## #9 Flashback



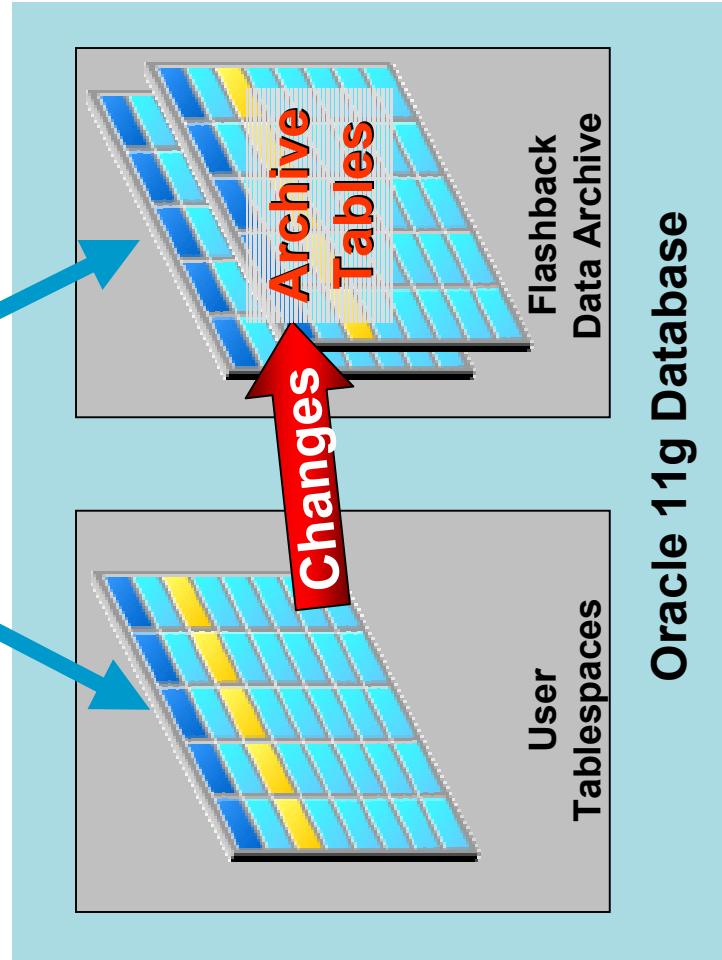
# Flashback Data Archive

## Total Data Recall

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DATA BASE  
11g

Select \* from orders  
AS OF 'Midnight 31-Dec-2004'

- Tamper-proof data archive
- Efficient storage and retrieval of undo
- Keep data for months, years, decades!
- Fast access to even very old data
- View data, versions of rows as of any time
- Control data retention time, purging of data



Oracle 11g Database

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#10 Finer

Grained

Dependency

Tracking

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# Finer Grained Dependency Tracking

- Fewer Invalidations
  - Add to a specification – so what
  - Add/Drop/Modify a column – so what
- Holds true with view modifications too
  - Change a synonym pointer – so what
  - Replace a procedure – so what

# Compression

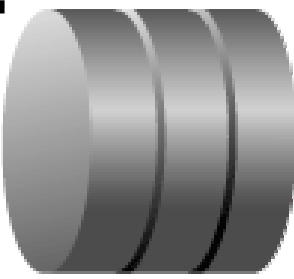
## #11 OLTP Table



# Oracle Advanced Compression

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D A T A B A S E



- Oracle 9i compresses data only during bulk load; useful for DW and ILM
- Oracle **11g** compresses w/ inserts, updates
  - Trade some cpu for disk & i/o efficiency
- **Compress** large application tables
  - Transaction processing, data warehousing
- Compress **all data types**: structured, unstructured
  - Savings cascade to all db copies: test, dev, standby, mirrors, archiving, backup, etc.

Up To  
**3X**  
Compression

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